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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/549,570

05/24/2006

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0563-1055

9532

466 7590 09/26/2007

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EXAMINER

COLEMAN, KEITH A

ART UNIT

PAPER NUMBER

3709

MAIL DATE

DELIVERY MODE

09/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/549,570

Applicant(s)

CARBONNE ET AL.

Examiner

Keith A. Coleman

Art Unit

3709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 9/19/2005
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2,3,6,8,11,12,13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Morikawa (US Patent No. 6,138,638).

With regards to claim 1, the patent to Morikawa discloses a method of synchronizing the injection with the engine phase in an engine (1, Col. 29, Lines 19-23) with electronic injector control (50, Col. 31, Lines 25-30) having n cylinders into which fuel is injected directly into each of the cylinders successively (Col. 31, Lines 24-27, Col. 1, Lines 14-20, n=4) in a predetermined sequence (Col. 31, Lines 24-27), the fuel injection being synchronized with the position of the piston in the corresponding cylinder (Col. 31, Lines 27-40), characterized in that it comprises the following steps, performed when the engine (1) is started (S22, Col. 40, Lines 25-30, Abstract, Figures 9 and 10) injection of fuel into m cylinders in the predetermined injection sequence when the corresponding pistons (Col. 31, Lines 27-40), put into motion by means of a starter (44, Col. 41, Lines 43-45), are at the end of the compression phase (via S3 in Figure 3 using Figure 14, Col. 36, Lines 56-68 through Col. 37, Lines 1-25), m being determined in advance as a function of n (S2, Col. 37, Lines 11-16), - measurement of the engine

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speed (Figure 3, Col. 37, Lines 1-5), continuation of the injection in the predetermined sequence if the engine speed and/or its acceleration exceed a predetermined threshold (Col. 39, Lines 9-20, Figures 7 and 8, Abstract), the injection being synchronized with the engine phase in this case (Col. 39, Lines 9-20, Figures 7,8,14,15, 22, and 23), continuation of the injection with a phase change with respect to the preceding injections and with respect to the predetermined sequence (Col. 39, Lines 9-20, Figures 7,8,14,15, 22, and 23), this phase change being a function of  $n$  and  $m$  (Col. 31, Lines 27-40), so that the injection is synchronized with the engine phase, in the contrary case (Col. 39, Lines 9-20, Figures 7,8,14,15, 22, and 23). It should be noted that when abnormal conditions occur or predetermined threshold a different routine is executed (Col. 39, Lines 9-20).

With regards to claim 2, the patent to Morikawa discloses the synchronization characterized in that the engine speed is measured after approximately one revolution of the engine (via S3 in Figure 3 using Figure 14, Col. 36, Lines 56-68 through Col. 37, Lines 1-25).

With regards to claims 3 and 8, the patent to Morikawa discloses the synchronization for an engine having an even number of cylinders (Col. 29, Lines 5-20).

With regards to claims 6, 11, and 12, the patent to Morikawa discloses the position of the pistons in the cylinders of the engine is determined by a position sensor

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(39) measuring the angular position of the corresponding engine flywheel. It is noted that the angular displacement of the crankshaft is inherently the same as the engine flywheel.

With regards to claims 4, 9, 10, the patent to Morikawa discloses that a second measurement of the engine speed and/or its acceleration is made after  $p$  further injections,  $p$  being determined in advance as a function of  $n$  and  $m$ , to check that the synchronization is correct. In Figure 14, Morikawa discloses fuel injection signals as a function of time in one cycle i.e. two rotations of the crankshaft. Morikawa further discloses that every 10 milliseconds or any predetermined length of time the fuel injection routine (See Figure 24, Col. 38, Lines 65-67 through Col. 39, Lines 1-4) is executed and explicitly states that the determination of a cylinder, such as a cylinder to be ignited and a cylinder to be injected, is carried out based on the combustion stroke sequence i.e.  $p$  being determined in advance as a function of  $n$  and  $m$ . Referring back to the routine, its purpose is to find abnormalities in the fuel injection system. When  $p=0$  and after 20 milliseconds, Morikawa's routine checks the status of synchronization twice.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 5, 7, 13, 14 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa (US Patent No. 6,138,638)

With regards to claim 5, the patent to Morikawa discloses all the limitations of the claimed subject matter, including varying a predetermined time dependent measurement of the engine speed and its acceleration during two actual revolutions of

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the engine, except does not positively disclose the second measurement of the engine speed and its acceleration is made after two actual revolutions of the engine, in other words after  $n$  injections of fuel. Since Morikawa discloses a table (See Figure 15) as a function of both number of injections and time, and explicitly states that a predetermined amount of time can be set for measurement taking, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the predetermined time interval of Morikawa with a time duration of one cycle i.e. 720 degrees, in order to find abnormalities in the fuel system.

With regards to claims 13 and 14, the patent to Morikawa discloses the position of the pistons in the cylinders of the engine is determined by a position sensor (39) measuring the angular position of the corresponding engine flywheel. It is noted that the angular displacement of the crankshaft is inherently the same as the engine flywheel.

With regards to claims 7, 15, 16, 17, 18, and 19, the patent to Morikawa discloses that the dose of fuel injected in the first  $m$  injections is smaller than that used in the subsequent injections. In Figure 8, Morikawa discloses that depending on the targeted air-to-fuel ratio, the quantity of fuel dispersed in the cylinders is increased or decreased but does not positively disclose after  $m$  injections. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to

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modify the dosage of fuel injected of Morikawa with the injection being after m injections, in order to be within the targeted air-to-fuel ratio.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shinoda et al. (US Patent No. 3,719,176) shows the current state of the art.

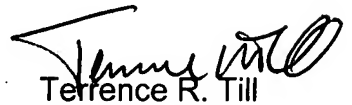
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith A. Coleman whose telephone number is 571-270-3516. The examiner can normally be reached on Monday through Friday between 8-5 Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrence Till can be reached on (571) 272-1280. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Terrence R. Till  
Supervisory Patent Examiner

KAC

